DEQ
Montana Department of Environmental Quality

Board of Environmental Review

Memo

TO: Andres Haladay, Hearing Examiner
Board of Environmental Review

FROM: Joyce Wittenberg, Interim Board Secretary
P.O. Box 200901
Helena, MT 59620-0901

DATE: March 30, 2017

SUBJECT: Board of Environmental Review Case No. BER 2017-05 SUB

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW

OF THE STATE OF MONTANA

IN THE MATTER OF: MONTANA NORTHWEST COMPANY'S APPEAL OF DEQ WAIVER REVIEW COMMITTEE'S DECISION TO DENY ALLA AND YEVEGENIY KIRILOVICH'S REQUEST FOR A SOURCE SPECIFIC MIXING ZONE FOR BLOCK 1, LOT 3 OF SOL ACREAGE TRACTS #2, EQ#17-1160, MISSOULA COUNTY, MISSOULA, MONTANA.	Case No. BER 2017-05 SUB

The BER has received the attached request for hearing.

Please serve copies of pleadings and correspondence on me and on the following DEQ representatives in this case.

Aaron Pettis
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Todd Teegarden
Bureau Chief
Engineering Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Attachments

MONTANA NORTHWEST COMPANY

Ms. Hillary Houle
Department of Environmental Quality
Board of Environmental Review
1520 East 61 h Avenue Helena, MT 59620

RE: Lifting of Sanitary Restrictions for Block 1, Lot 3, of Sol Acreage Tracts 2nd Filing,
EQ# 17-1160

Dear Ms. Houle,

I am writing on behalf of our clients, Alla and Yevegeniy Kirilovich to request a fair hearing with the Board of Environmental Review pursuant to Mont. Code Ann.§ 76-4-126 and the Montana Administrative Procedures Act. Enclosed with this letter is a copy of the decision of the Department of Environmental Quality denying our application for a source specific mixing zone.

The reason for this request is because Montana Northwest Company (MTNWCO) has provided DEQ with a design that complies with the non-degradation manual, specifically source specific mixing zone rules, following each of the specific rules, showing how each is complied with. Our proposed design solutions do address the treatment requirements associated with a source specific mixing zone, all of which have been rejected by DEQ. We believe the reason for the rejections by DEQ is based upon lack of facts and consensus at DEQ, and not upon actual policy. We believe, our system solution should be granted as similar proposed solutions have been granted in the past not only in Montana, but in several other states as well.

Please confirm that this notice of appeal has been timely received by the Board of Environmental Review, and please feel free to contact me at your convenience if I can provide any additional information at this time.

MONTANA NORTHWEST COMPANY

Jeff Standaert, PE
Civil Engineer
Montana Northwest Company

DEQ
Montana Department of Environmental Quality

March 16, 2017

Jeff Standaert, PE
Montana Northwest Company
P.O. Box 8777
Missoula, Montana 59807

RE: Sol Acreage Tracts #2 Lot 3
Missoula County
EQ # 17-1160

Dear Mr. Standaert:

The request for a source specific mixing zone has been **denied** by the DEQ waiver review committee as defined in ARM 17.30.518 and ARM 17.36.802. A copy of the source specific mixing zone request committee review report has been enclosed along with this formal denial letter. A copy of this denial letter will be sent to both the local county health department and the owner for their records.

Summary of committee findings:

Applicant submitted information to show 4-log virus attenuation was achieved at the end of the 30 foot source specific mixing zone using a combination of Virulo analysis and the Wyoming model for horizontal travel time.

Applicant submitted three unique analyses:

1. The Virulo model was used to estimate the log attenuation in 8 inches of loam, the soil identified near the ground surface. The resulting log attenuation was 2.2.
2. The Virulo model was again used to estimate the log attenuation in 10 inches of loamy sand, the soil identified as the second horizon below the loam. Information from the applicant indicates that the coarse fragment percentage in this horizon ranges from 35 to 60 percent which is consistent with the official series description of the Grantsdale soil series, the predominant (85 percent) soil in the complex covering this area. The National Cooperative Soil Survey indicates variation in the coarse fragment percentage with rock fragments ranging from 35 to 70 percent, cobbles ranging from 5 to 20, and gravel ranging from 30 to 50 percent. Virulo was used with a "pro-rated" depth of 10 inches of loamy soil based on an assumed coarse fragment percentage of 60 resulting in 1.68 logs of virus attenuation. Information from the EPA, developer of the Virulo model, indicates that this is an inaccurate application of the model and does not result in a truthful representation of log virus attenuation due to the reduced pore space and preferential flow paths that develop in the presence of significant coarse fragment percentages.
3. The Wyoming model was used to estimate the travel time once pathogens had reached the saturated zone of groundwater. A soil texture of loamy sand was used resulting in 0.118553 logs of virus attenuation. However, loamy sand is not an accurate

representation of the soil in the saturated zone, which contains 35 to 70 percent coarse fragments. When the Wyoming model is used to determine log attenuation with gravel or gravelly sand, the log attenuation is less than 0.1.

Based on the incorrect application of the Virulo model with a pro-rata depth of loamy sand coupled with the use of loamy sand in the Wyoming model, 4 log virus attenuation was not achieved and the request did not meet the requirements for issuance of a source specific mixing zone.

If you wish to challenge the conditions of this Source Specific Mixing Zone Request Approval, you may request a hearing before the Board of Environmental Review or the Department, pursuant to Section 76-4-126, MCA and the Montana Administrative Procedures Act.

If you have any questions regarding the above, please contact me at the Water Quality Division at 406-444-4769.

Sincerely,

Ashley Kroon, EI
Environmental Engineer
Subdivision Section
Engineering Bureau
e-mail – Akroon@mt.gov

cc: file
Missoula County Sanitarian
Owner

Montana Northwest Company. P.O. Box 8777 Missoula, MT 59807

Lifting of Sanitary Restrictions for Block 1, Lot 3 of Sol Acreage Tracts 2nd Filing

SW1/4 OF S 8, T13N, R20W
MISSOULA – MISSOULA COUNTY, MONTANA

Source Specific Mixing Zone Request

A Source Specific Mixing Zone is requested for Lot 3 for the proposed elevated sand mound. This request is to keep the mixing zone from extending into a proposed well isolation zone.

We are requesting a mixing zone of 30' as opposed to the 100' standard mixing zone for a single family home; according to Table 1 of Standard Groundwater Mixing Zone Summary Table, "How to Perform a Non-degradation Analysis for Subsurface Wastewater Treatment Facilities" Lot 3 is 1.0645 acres. The calculations regarding nitrate sensitivity and phosphorous breakthrough for a 30' mixing zone are within the allowable limits.

The 30' Source Specific Mixing Zone and other lot characteristics were analyzed using the Pathogen Transport Spreadsheet from Appendix U of Department of Environmental Quality's (DEQ), to determine if the source specific mixing zone would achieve a 4.0 log virus removal by the end of the mixing zone.

Parameters such as Hydraulic Conductivity, groundwater gradient, depth to groundwater, distance to drinking water well, effluent application rate, type of soil, etc. These values were found the following ways:

Hydraulic Conductivity: The Montana GWIC web site was used to download nearby well logs. Four (4) wells near this property were used for conductivity estimation. Hydraulic conductivity (k) was found using the Fetter Hydraulic equations. The average is indicated on the spreadsheet attached in Appendix B. The average of these 4 wells is 807.3 ft/day.

Groundwater Gradient: The direction of groundwater flow (N6°W) was determined from Montana Groundwater Atlas Assessment 4, Part B, Map 6, from the Montana Bureau of Mines and Geology.

Distance between contours on the potentiometric map is approximately 8200 ft and an elevation change of 20 ft (20 / 8200 ft) = 0.00224 ft/ft.

Depth to Groundwater is the depth from the highest groundwater found from groundwater monitoring, which is 9' 7" minus the depth of the drainfield laterals, which in this case is above ground.

Average daily water use is expected as 1000 gpd includes irrigation.

Annual precipitation is the amount from NOAA of 14 in/yr.

The Nitrate Sensitivity Analysis calculation worksheet indicates the nitrate concentrations will be below the 5.00mg/l maximum allowed.

Lot 3 - Nitrate Concentration at End of Mixing Zone = 2.42 mg/l

The Phosphorous Breakthrough Analysis worksheet indicates there would be no impact on surface waters in over 56 years. This is above the 50-year minimum required.

Lot 3 - Intercepts the Big Flat Ditch which is approx. 240 feet away in 56.0 years

See the Site Layout Plan for the mixing zone boundary.

We are proposing a sand mound for this project. The reason is not because of high ground water, but to gain better treatment in the tight setbacks of the lot layout. The problem at the site is fast moving soils with poor adsorption properties available for treatment. Utilizing a raised mound, we utilize not only imported sand under the laterals, but also the loamy soil at ground level, and then some of the very cobbly sandy loam soil, would provide treatment as well. The evaluation of viruses was partially completed using the EPA VIRULO program. We ignored the 12" of C-33 sand underneath the proposed laterals for virus removal because DEQ has indicated that there is not enough evidence to prove that imported sand will provide adsorption that corresponds to the output of the VIRULO program. The VIRULO program only pertains to in-situ soils. The first in-situ soil the effluent shall hit is the loam. On two soil profiles, we show between 8" and 13" of loam. We used 8" to be conservative. 8" of loam yileds 2.2 logs of virus removal in the vertical direction. Next, we have available at least 24" to 40" of very (35 to 60%) cobbly loamy sand. Instead of using all 24" of this soil type, we go even more conservative and use 10" of loamy sand in VIRULO, which shows 1.68 log removal. Together with the loam, this equals 3.8867 log removal.

We ignore the extremely cobbly loamy sand soil beneath this, because DEQ gives no credit for this soil. We look now at just the horizontal factor. Several equations are built into the "horiz tot – df to well" tab that compute the log removal in the horizontal direction. The 30-foot mixing zone provides another 0.1185 logs of virus removal, which in total gives the desired 4.0 log removal of viruses by the end of the mixing zone.

Our argument, for approval, is that the very cobbly loamy sand soil should be given some credit in VIRULO as this soil is between 35 to 60% cobbles, not the type over 60%. Soils with over 60% cobbles and gravel, should require further treatment. Our basis for this assumption is regulations in Washington State.

Washington State has 7 soil types in its onsite wastewater system regulations. Type 1 soils are with 90% gravel or cobbles, sandy type soil. Type 2 are between 90% and 60%. These are prescribed a method of treatment, in relation to where the water table is at, and the type of application. Washington does not let systems get built in type 1 soils, on smaller than a 2.5-acre lot. Most other types of soils require 1.0 acre or larger.

The very cobbly loamy sand (the type of soil we have) would be considered a type 3 soil in Washington and would get conventional treatment (pressure dosed drainfield). No mound would be needed, because the groundwater is not high. Washington utilizes sand lined trenches, because of the multitude of studies that show that placing sand beneath the laterals does help with virus removal.

These multitude of studies are summarized in a Washington State Department document called "Type 1A Soil Issues". They have built their regulations around these studies, showing that imported sand does work, when accompanied by small doses, and pretreatment. In this case, we do not have pretreatment except for a septic tank but we will design small doses into the sand mound, to help with treatment.

I realize that this is Montana, and not Washington, and we must follow the rules in Montana, but it doesn't seem to me that the rules or law in Montana is clear when it comes to source specific mixing zones in fast moving soils and what the proper treatment should be, and how to analyze it exactly. I have shown that this system is approvable as per the "How to Run a Non-deg" document, that outlines the need to show the 4.0 log inactivation. I have shown that we have willingly omitted 12" of imported sand, and over half of the decent loamy sand soil, and we still provide 4.0 log inactivation.

Another reason for approval for this system is the relatively low level of background nitrates in the water sampled. This subdivision was created in the 60's. Systems have existed since then, and just about every one of the lots in this subdivision have been built upon, with a well and a septic system. The lot to the east of the subject lot was sampled for nitrates, and we found a low value, relatively (0.83 mg/L). The well sampled was most likely drilled at the time of the septic installation in 2002 for 11800 Virginia Lane. This lot is just north of 11825 Virginia Lane., which has a very nicely drawn permit, with dimensions. See last page of attached

permit. We show 11825 Virginia Lane septic system on an Overall Lot Layout drawing. This drainfield was built in 1985, gravity distribution, only 57 feet horizontally, along groundwater flow, from the well isolation zone of the well sampled. The soil type boring from the permit shows similar soils to the ones found on Block 1, lot 3; thus, treatment has been taking place since 1985, and we feel with our modifications and newer technology, the same will be true for the proposed system on the subject lot.

If my reasoning to this point is not persuading you of an approval, the last modification we could make at this location is to install an Advanced Enviro Septic laterals from Presby, along with our sand mound system, to further treat the effluent. I realize Presby does not boast virus removal, but it does remove a lot of coliform bacteria, which viruses are usually present in the presence of coliforms.

Thank you for your review and guidance.

Prepared by:
Montana Northwest Company

Jeff P. Standaert

Jeffrey P. Standaert, 32937 PE

3/14/2017
Date

Enclosures

Missoula County Permit # 85-311
Overall Site Layout
Site Layout
Nitrate Sensitivity Calculations
Phosphorous Breakthrough Calculations
Pathogen Transport Worksheet
Washington Soil types
Washington Treatment Options
Type 1A Soil Issues
Soil Profiles

Big Flat

MISSOULA CITY-COUNTY HEALTH DEPARTMENT
301 W. Alder 728-4515

13
20 Permit No. 85-311
08 Log No. _____

NW of SW

INDIVIDUAL SEWER SYSTEM INSPECTION REPORT

Name of Owner LEISTER DEAN

Name of Installer TUXBURY Sub. Sol Acreage Tracts 2

Legal Address 11825 Virginia Lane & Big Flat Rd SE Corner Lt 2 BLK 2 Sol Acres #2

Water Supply: Private X Public _____

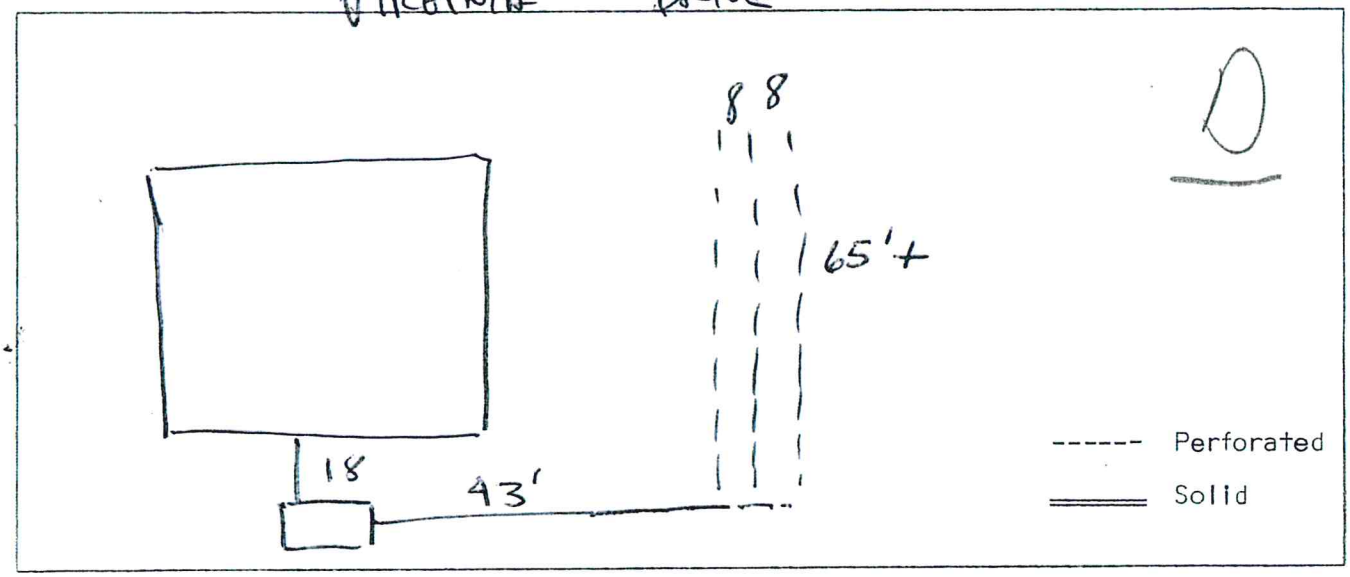
Description of System: New X Replacement _____

Septic Tank Capacity 1000 Drainfield Material _____
Septic Tank Material _____ Drainfield Length 200'
Depth of Septic Tank _____ Drainfield Depth _____
Other _____

Soil Type _____

Distance of Installation from:
Property Lines: Front _____ Back _____ Side _____
Wells _____ Canals _____ Lakes _____ Streams _____

VIRGINIA DRIVE



85-311

Installation Inspected:

☐ Disapproved _____ Sanitarian _____ Date _____

☒ Approved _____ Sanitarian _____ Date _____

Corrections Necessary: cut off exit pipe & seal hole

Inspection Witnessed By x Marvin D Johnson _____ Date _____

MISSOULA CITY-COUNTY HEALTH DEPARTMENT
301 W. Alder (406)721-5700 Permit # 85-311

SEWER PERMIT AND APPLICATION

Owner/Applicants Name Leister Dean Phone#_____

Owner/Applicants Address_____

Certified Installer Dan Tuxsbury

Location of Installation: ____ 1/4 ____ 1/4 T 13 R 20 Section 8
Address of Site 11825 Virginia Lane
Certificate of Survey #_____ HD #_____
Subdivision_____
Lot 2 Block 2
Tractland SOL ACREAGE TRACTS NO. 2
General area name_____

Size of Lot or Parcel_____ ½

Any existing structure or sewage disposal facilities: Yes____ No X

If Yes, Explain:_____

Residential - Number of Bedrooms_____ Commercial_____ gal/day_____

Water supply: Private X Public_____ Multi-family_____

Soil Type Sandy silt?

Depth to groundwater_____

Type of system to be installed: New X Replacement____

System size: From Plat approval _____ From site evaluation # EMT soil profile
Application rate .8 Gal./square Ft/day
Square feet per bedroom_____
Engineered _____

Description of System to be installed 1000 gallon tank and 190 ft of drainfield in area of soil profile shown on existing site plan.

Special Conditions Clear floodplain separation (100')

As purchaser of this permit, I agree to install an individual sewer system which meets all requirements as specified in the Missoula County rules and regulations for subsurface sewage disposal systems.

Permit Pruchaser T & T Construction Date: 10-9-85

Health Authority [signature] Date: 8-27-85

This permit is valid for 12 months. Construction of the sewage disposal system must commence during this time or the permit is no longer valid. A final inspection by the Department is required prior to covering the installed system. Applicant's copy of the permit must be on-site at the time of inspection. Please use the permit number in the upper right hand corner for reference when you call for a final inspection.

CMT CONSULTANTS, INC.

LOG OF BORING

FOR

LEISTER DEAN PARCEL - BIG FLAT
LOT 2 BLOCK 2 - SOL ACREAGE
TRACTS NO. 2

Consulting Geotechnical and Construction Materials Engineers

DATE: 4-30-85

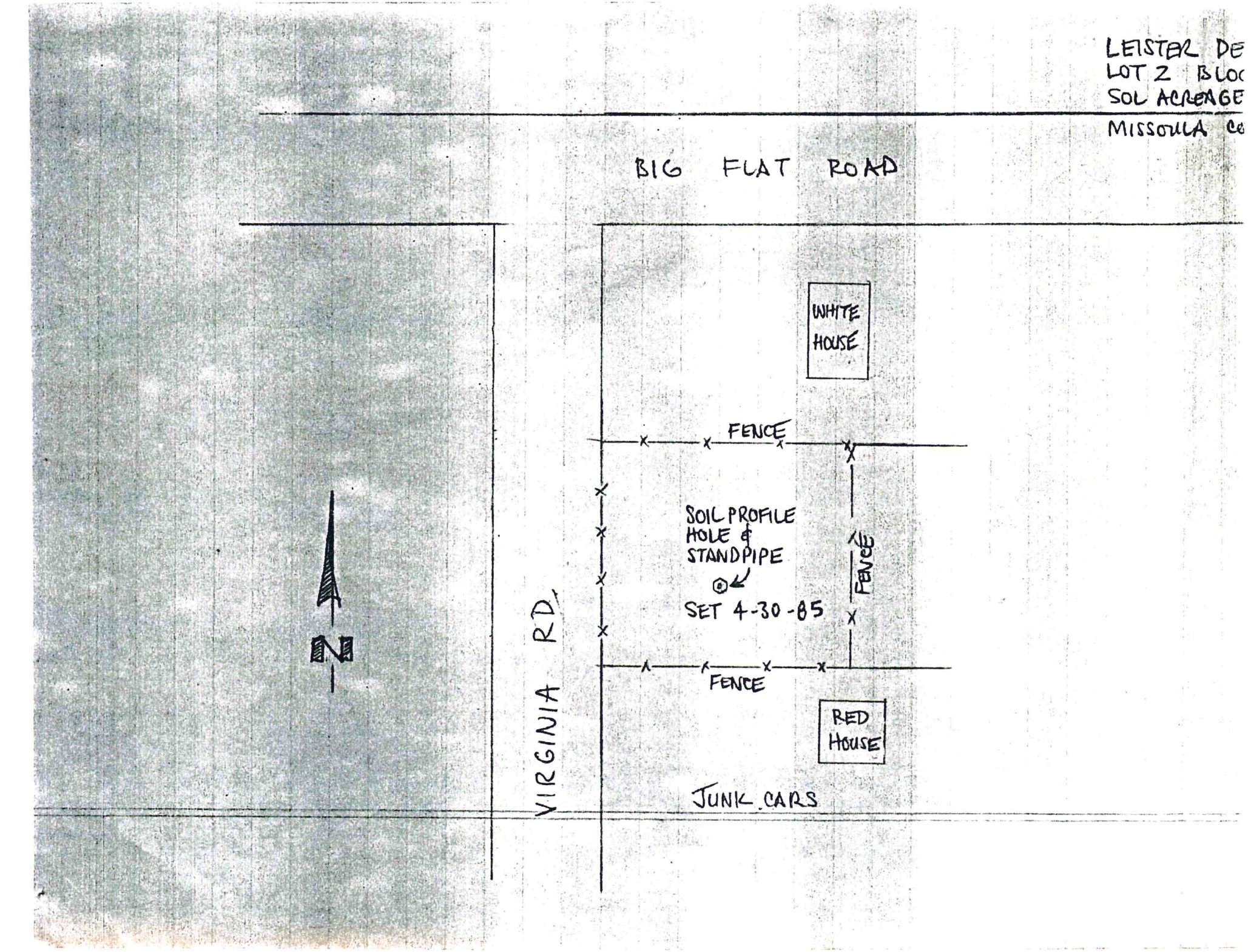
PROJECT LOCATION: MISSOULA CO, MT. TYPE: AUGER

BORING NO. 1

LOCATION: SEE SKETCH

DEPTH FEET	SYMBOL	SAMPLE	N - BLOWS PER FOOT	MATERIAL DESCRIPTION	CORE DRILLED	CORE RECOVERED	ELEVATION	DEPTH SCALE
0				SAND, silty, tan .8 g/ft²/day				
5				STAND PIPE DEPTH = 7.0'				
				SAND & GRAVEL, silty, tan				
10				▼ GROUNDWATER @ 13.0' 4-30-85				
15				Total depth of boring = 15.0 feet P.V.C. standpipe left to 7.0 feet only due to hole caving.				

LEISTER DE
LOT 2 BLOC
SOL ACREAGE
MISSOULA Co



MISSOULA CITY-COUNTY HEALTH DEPARTMENT

RECEIVED

SEP 10 1985

GMT CONSULTANTS, INC.
MISSOULA

September 9, 1985

% T & T Construction
2615 Clark
Missoula, MT 59801

RE: Lot 2 Block 2 Sol
Acreage Tract #2

Dear Sir,

The above mentioned lot has passed groundwater testing and soils testing requirements of our office. We will require the following for a sewer permit approval:

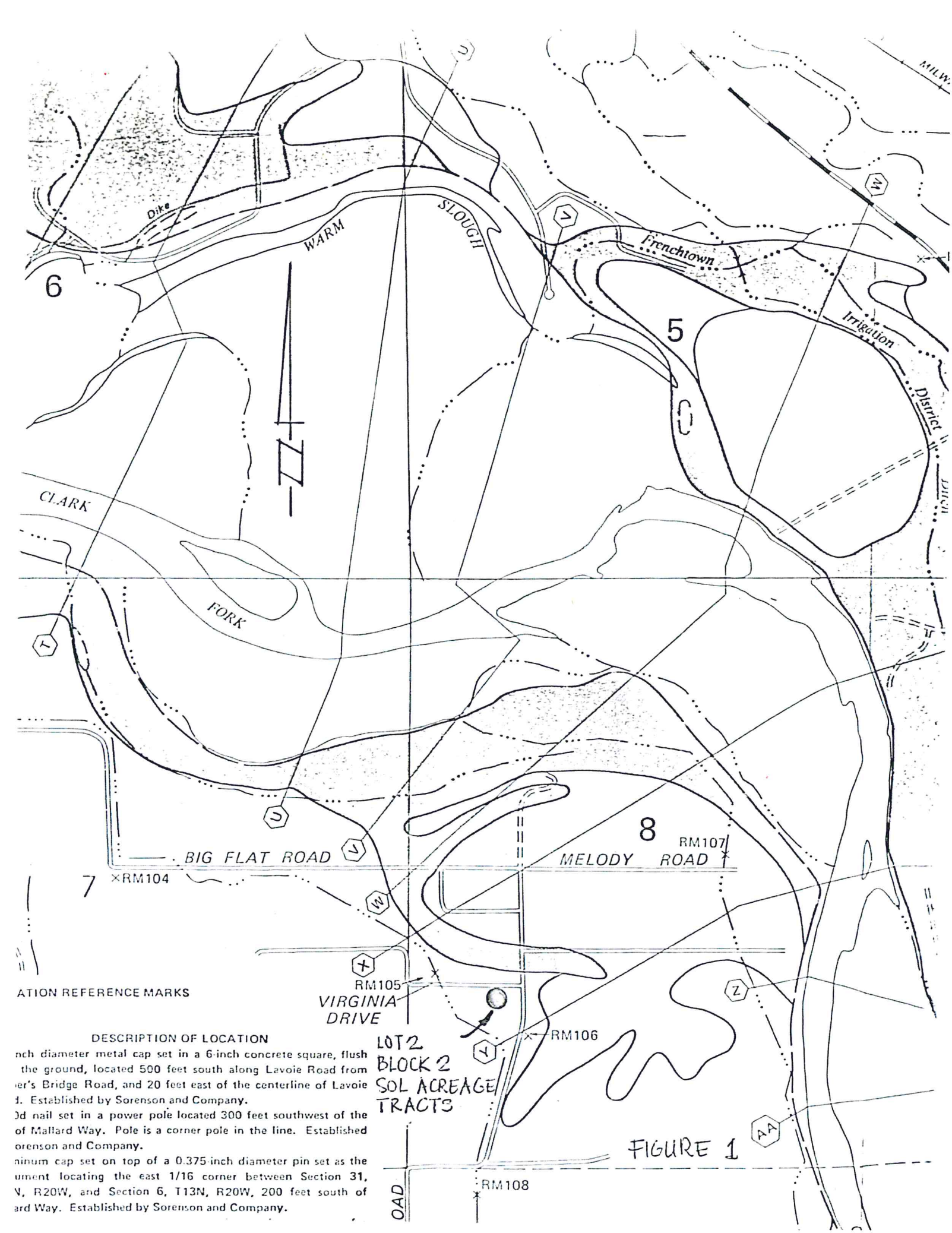
1. Zoning and floodplain approval.

2. A site plan showing 100' separation from floodplain to the drainfield and location of the drainfield is in the area of groundwater testing.

Sincerely,

Doug Kikkert
Environmental Health Specialist

DK:jr
cc: Leister Dean % GMT Consultants, P.O. Box 3418, Msla., MT 59806



ATION REFERENCE MARKS

DESCRIPTION OF LOCATION

nch diameter metal cap set in a 6-inch concrete square, flush the ground, located 500 feet south along Lavoie Road from ier's Bridge Road, and 20 feet east of the centerline of Lavoie d. Established by Sorenson and Company.

)d nail set in a power pole located 300 feet southwest of the of Mallard Way. Pole is a corner pole in the line. Established orenson and Company.

ninum cap set on top of a 0.375-inch diameter pin set as the ument locating the east 1/16 corner between Section 31, N, R20W, and Section 6, T13N, R20W, 200 feet south of ard Way. Established by Sorenson and Company.

FIGURE 1

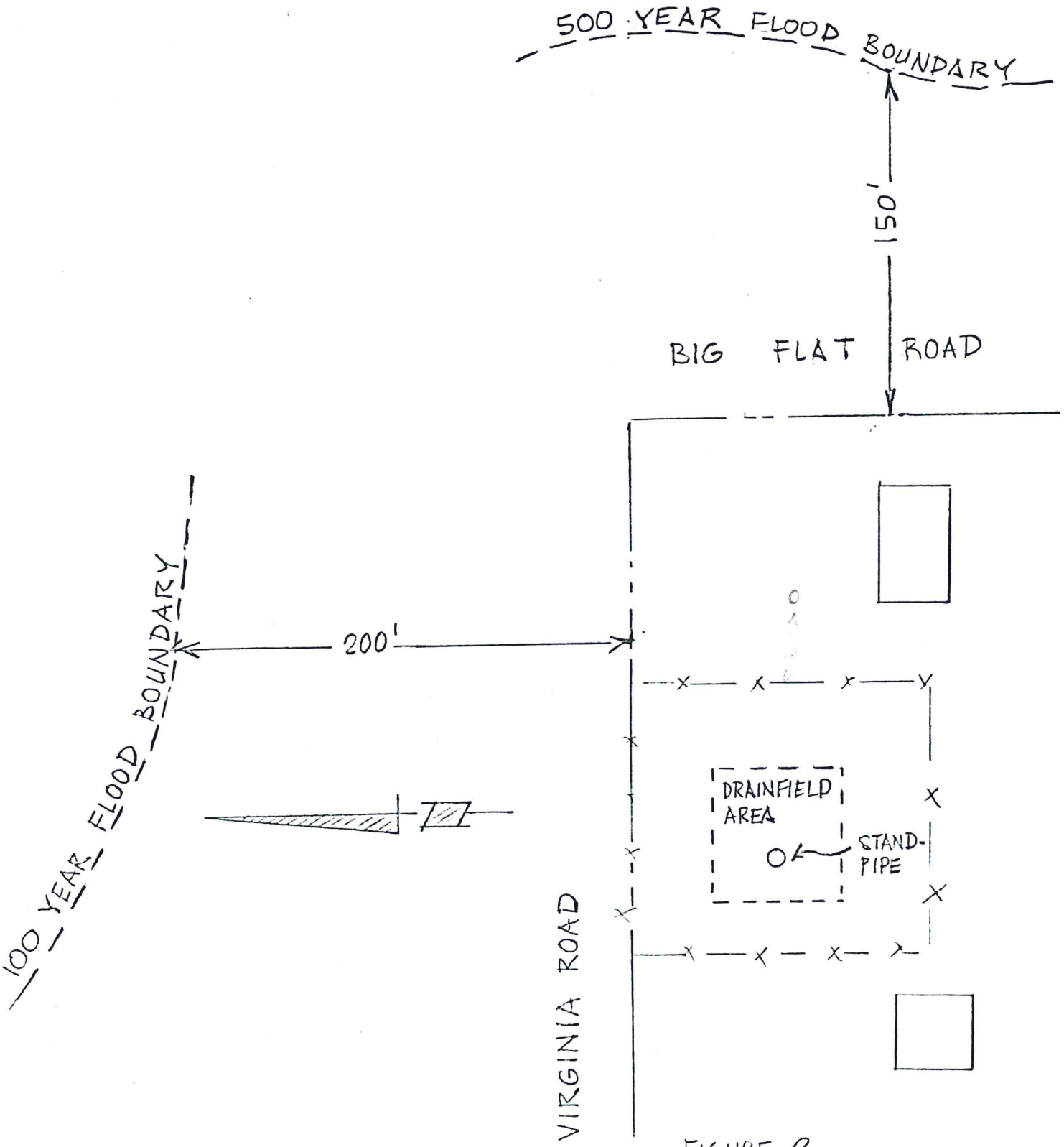


FIGURE. 2

LOT 2 BLOCK 2
SOL ACREAGE TRACTS

9-10-85

GROUNDWATER TEST REPORT

Name LEISTER DEAN Date 5/6/85

Location of Test Holes _____

(Map on reverse side) _____

Results

Depth to Groundwater

Date	No. 1	No. 2	No. 3	No. 4	Initials
5/23/85	9' dry				
6/3/85	9' dry				
6/11/85	9' dry				DWR

Recommendations: Approval letter written

CMT CONSULTANTS, INC.

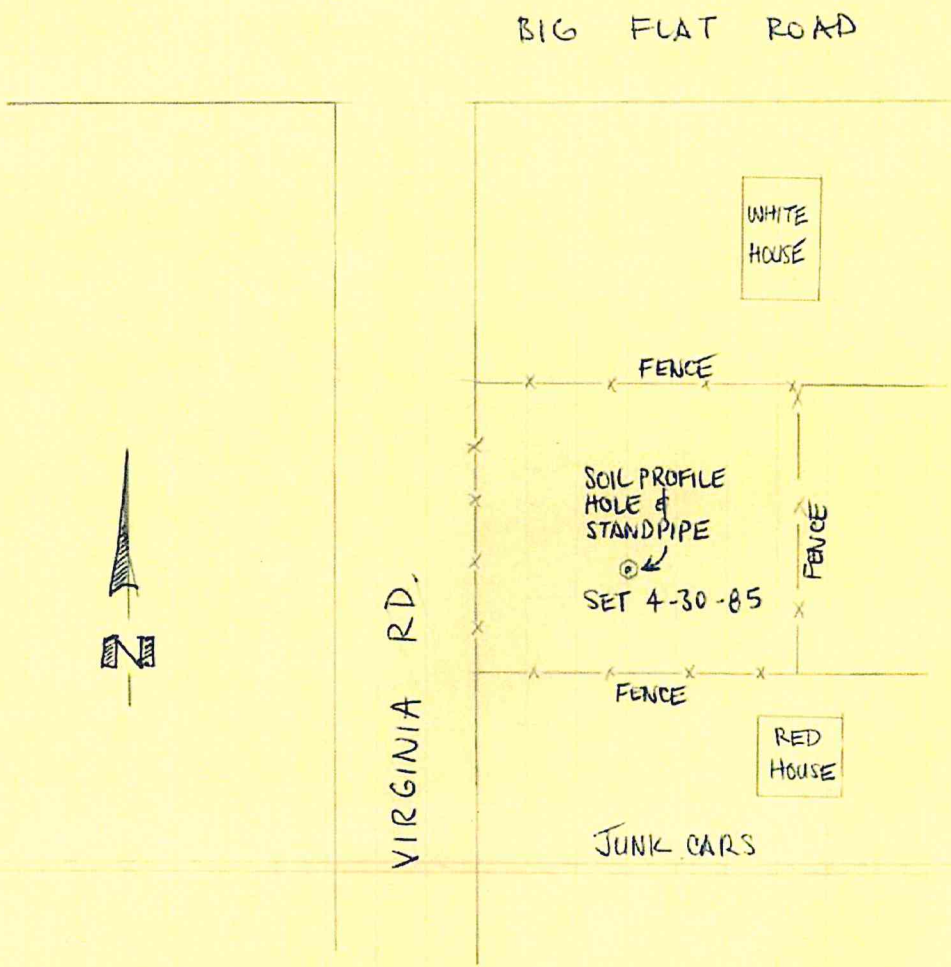
LOG OF BORING
FOR
LEISTER DEAN PARCEL - BIG FLAT
LOT 2 BLOCK 2 - SOL ACREAGE
TRACTS NO. 2

Consulting Geotechnical and Construction Materials Engineers

DATE: 4-30-85
BORING NO. 1
PROJECT LOCATION: MISSOULA CO, MT. TYPE: AUGER
LOCATION: SEE SKETCH

DEPTH FEET	SYMBOL	SAMPLE	N-BLOWS PER FOOT	MATERIAL DESCRIPTION	CORE DRILLED	CORE RECOVERED	ELEVATION	DEPTH SCALE
				SAND, silty, tan .89 ft/day				
5				STAND PIPE DEPTH = 7.0'				
				SAND & GRAVEL, silty, tan				
10				▼ GROUNDWATER @13.0' 4-30-85				
15				Total depth of boring = 15.0 feet P.V.C. standpipe left to 7.0 feet only due to hole caving.				

LEISTER DEAN PARCEL
LOT 2 BLOCK 2
SOL ACREAGE TRACTS NO. 2
MISSOULA COUNTY, MT.



May 7, 1985

John J. Crawford
GMT Consultants
2500 Murphy
Missoula, MT 59801

Re: Leister Dean Groundwater Test

Dear Jay:

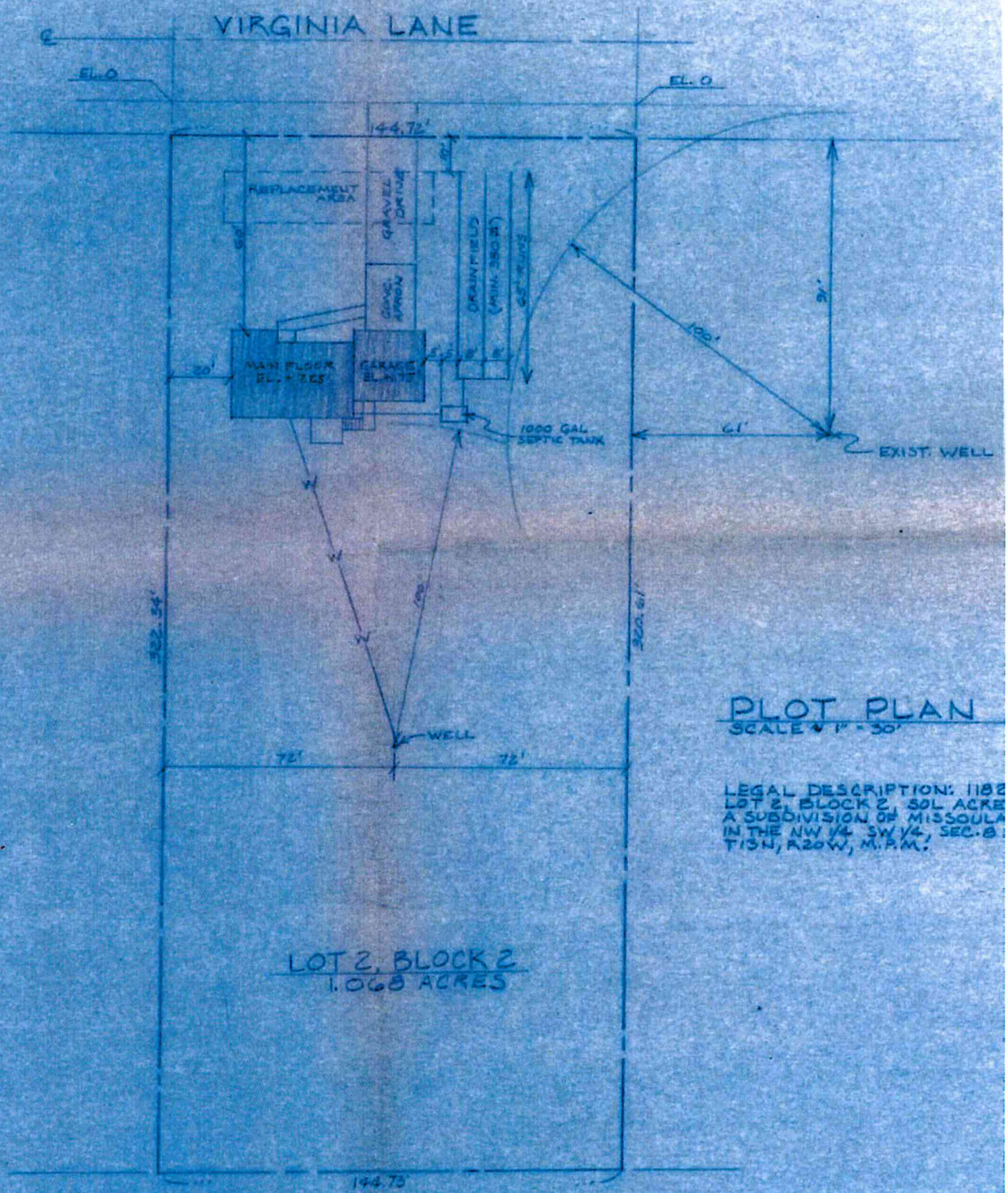
The depth of the monitoring pipe on the Leister Dean groundwater test is only 5 feet. We cannot determine if minimum depth can be met from this hole.

To obtain information on groundwater depth, the hole should be 9 feet deep, but in no case can we monitor one that is only 5 feet deep. The pipe will have to be re-installed, and this office notified within one week to obtain a completed test for groundwater.

Sincerely,

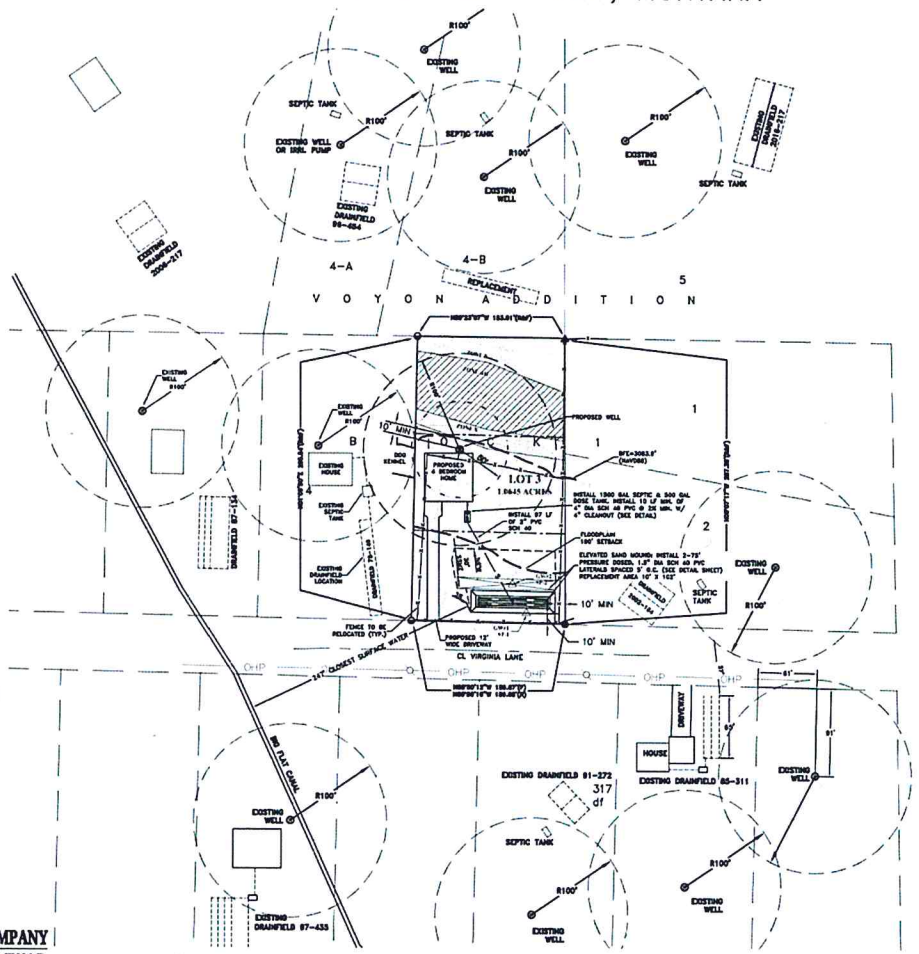
Tom Barger, R.S.

TB:mzc


VIRGINIA LANE
℄
EL. 0
EL. 0
144.72'
REPLACEMENT AREA
GRAVEL DRIVE
GRAVEL APRON
DRAIN FIELD (MIN. 350 SF)
65' RUNS
MAIN FLOOR EL. +7.25
GARAGE EL. +7.17
20'
1000 GAL. SEPTIC TANK
120'
61'
EXIST. WELL
WELL
72'
72'
322.54'
320.61'
144.73
LOT 2, BLOCK 2
1.068 ACRES
PLOT PLAN
SCALE 1" = 30'
LEGAL DESCRIPTION: 1182
LOT 2, BLOCK 2, SOL ACRE
A SUBDIVISION OF MISSOULA
IN THE NW 1/4 SW 1/4, SEC. 8
T13N, R20W, M.P.M.

SITE LAYOUT PLAN

LIFTING OF SANITARY RESTRICTIONS FOR BLOCK 1, LOT 3 OF
SOL ACREAGE TRACTS 2ND FILING,
LOCATED IN THE SW1/4 S.08, T.13N., R.20W., P.M.,M.,
MISSOULA COUNTY, MONTANA



NOTES:

1. PURSUANT TO ARM 17.36.330 POTENTIAL SOURCE OF CONTAMINATION WITHIN 500' OF PROPOSED WATER SOURCE AND DISTANCES ARE LISTED HERE:

   1.1. MC PERMIT NUMBERS:
   - 1.1.1. 2008-217 ~ 377' TO NW,
   - 1.1.2. 96-454 ~ 268' TO NW,
   - 1.1.3. 2014-171 ~ 413' TO NE,
   - 1.1.4. 78-149 ~ 117' TO SW,
   - 1.1.5. 2002-164 ~ 227' TO SE,
   - 1.1.6. 91-272 ~ 360' TO S,
   - 1.1.7. 85-311 ~ 360' TO SE
   - 1.1.8. UNPERMITTED REPLACEMENT AREA ~ 166' TO N

2. LANDSCAPING SHALL INCLUDE NATIVE AND NON-NATIVE GRASSES, SHRUBS AND TRESS. A DISCUSSION WITH THE LOCAL UNIVERSITY EXTENSION OFFICE CONCERNING APPROVED GRASS SEES MIXTURE, TREES AND SHRUBS IS RECOMMENDED.

LEGEND

- ● =SET 5/8" x 24" REBAR with 1-1/2" A.C. (MONTANA NORTHWEST CO 9320LS)
- ⊙ =FOUND 5/8" REBAR, NO CAP
- ▲ =FOUND 1-1/4" Y.P.C. (ILLEDGIBLE)
- (F) =FOUND THIS SURVEY
- (R) =RECORD OR ADDITIVE RECORD PER SOL ACREAGE TRACT 2ND FILING
- M.Z. =MIXING ZONE
- ○ =POWER POLE
- OHP =OVERHEAD ELECTRIC
- =FENCE
- =CENTERLINE
- SP/GW△ = SOIL PROFILE & GROUNDWATER MONITORING
- Ⓦ = WELL 100' RADIUS AS NOTED
- = PROPOSED DRAINFIELD (10'x77')
- = PROPOSED DRAINFIELD REPLACEMENT AREA (10'x102')
- 16% = DIRECTION OF GROUNDWATER FLOW
- 3% = GROUND SLOPE AT THE DRAINFIELD
- S = PROPOSED SEWER LINE, FORCEMAIN OR GRAVITY
- WTR = PROPOSED WATER LINE
- = 13,500 SQFT, OR ~ 1/3 ACRE LANDSCAPING/ LAWN DEFENSIBLE SPACE PERIMETER
- 0.00 = 1500 GAL SEPTIC / 500 GAL PUMP TANK

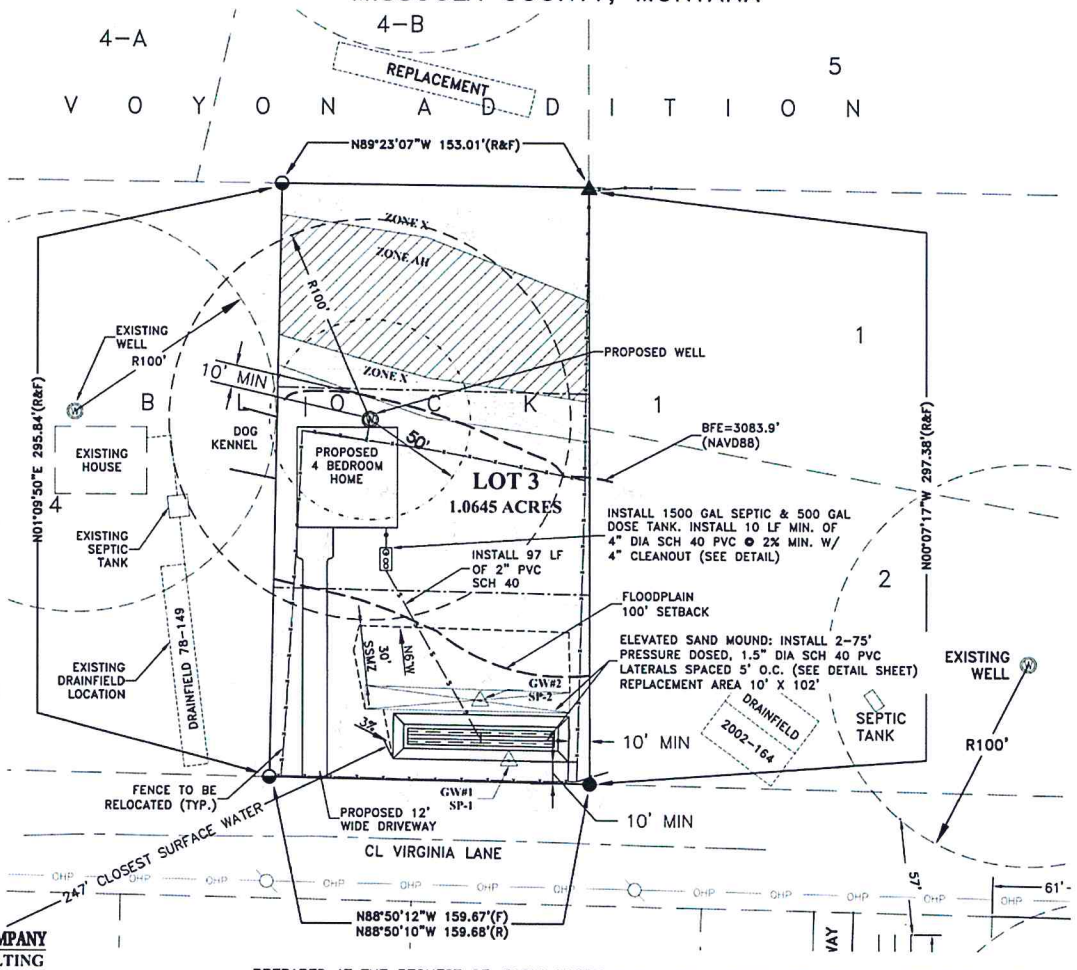
MONTANA NORTHWEST COMPANY
SURVEYING MAPPING PLANNING CONSULTING
P.O. BOX 8777, MISSOULA, MT 59807 PHONE 406-721-4033 FAX 406-721-4066

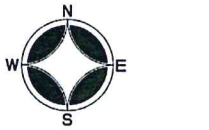
PREPARED AT THE REQUEST OF: CARLA HARDY & ALLA AND EUGENE KIRILOVICH · MTNWCO PROJ 2237-15 D-1047

PREPARED BY: S. CATHER

SITE LAYOUT PLAN

LIFTING OF SANITARY RESTRICTIONS FOR BLOCK 1, LOT 3 OF
SOL ACREAGE TRACTS 2ND FILING,
LOCATED IN THE SW1/4 S.08, T.13N., R.20W., P.M.,M.,
MISSOULA COUNTY, MONTANA





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1.1.4. 78-149 ~ 117' TO SW,
1.1.5. 2002-164 ~ 227' TO SE,
1.1.6. 91-272 ~ 360' TO S,
1.1.7. 85-311 ~ 360' TO SE
1.1.8. UNPERMITTED REPLACEMENT AREA ~ 166' TO N

2. LANDSCAPING SHALL INCLUDE NATIVE AND NON-NATIVE GRASSES, SHRUBS AND TRESS. A DISCUSSION WITH THE LOCAL UNIVERSITY EXTENSION OFFICE CONCERNING APPROVED GRASS SEES MIXTURE, TREES AND SHRUBS IS RECOMMENDED.

LEGEND
- ● =SET 5/8" X 24" REBAR WITH 1-1/2" A.C. (MONTANA NORTHWEST CO 9350LS)
- ⊙ =FOUND 5/8" REBAR, NO CAP
- ▲ =FOUND 1-1/4" Y.P.C. (ILLEDGIBLE)
- (F) =FOUND THIS SURVEY
- (R) =RECORD OR ADDITIVE RECORD PER SOL ACREAGE TRACT 2ND FILING
- M.Z. =MIXING ZONE
- =POWER POLE
- OHP =OVERHEAD ELECTRIC
- =FENCE
- =CENTERLINE
- SP/GW△ = SOIL PROFILE & GROUNDWATER MONITORING
- (W) = WELL 100' RADIUS AS NOTED
- = PROPOSED DRAINFIELD (10'x77')
- = PROPOSED DRAINFIELD REPLACEMENT AREA (10'x102')
- NSW = DIRECTION OF GROUNDWATER FLOW
- 3% = GROUND SLOPE AT THE DRAINFIELD
- S = PROPOSED SEWER LINE, FORCEMAIN OR GRAVITY
- WTR = PROPOSED WATER LINE
- = 13,500 SQFT, OR ~ 1/3 ACRE LANDSCAPING/ LAWN DEFENSIBLE SPACE PERIMETER
- 1500 = 1500 GAL SEPTIC / 500 GAL PUMP TANK

MONTANA NORTHWEST COMPANY
SURVEYING MAPPING PLANNING CONSULTING
P.O. BOX 8777, MISSOULA, MT 59807 PHONE 406-721-4033 FAX 406-721-4066

PREPARED AT THE REQUEST OF: CARLA HARDY & ALLA AND EUGENE KIRILOVICH MTNWCO PROJ 2237-15 D-1047

PREPARED BY: S. CATHER

DRAFTED 10/10/16 SDC: 2237-15 HARDY & KIRILOVICH ~ SITE LAYOUT.DWG REV. 3-14-17

Appendix E

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

NITRATE SENSITIVITY ANALYSIS

SITE NAME: Carla Hardy & Eugene Kirilovich
COUNTY: Missoula County
LOT #: Sol Acreage Tract 2nd Filing for Lot 3 Lifting
NOTES: NW1/4, SW1/4 S8T113NR20W: Primary

VARIABLES	DESCRIPTION	VALUE	UNITS
K	Hydraulic Conductivity	807.30	ft/day
I	Hydraulic Gradient	0.00224	ft/ft
D	Mixing Zone Thickness (usually constant)	4.50	ft
L	Mixing Zone Length (see ARM 17.30.517(1)(d)(viii)	30.00	ft
Y	Width of Drainfield Perpendicular to Ground Water Flow	92.42	ft
Ng	Background Nitrate (as Nitrogen) Concentration	0.83	mg/L
Nr	Nitrate (as Nitrogen) Concentration in Precipitation (usually constant)	1.00	mg/L
Ne	Nitrate (as Nitrogen) Concentration in Effluent	50.00	mg/L
#I	Number of Single Family Homes on the Drainfield	1.00	
QI	Quantity of Effluent per Single Family Home	26.70	ft3/day
P	Precipitation	14.00	in/year
V	Percent of Precipitation Recharging Ground Water (usually constant)	0.20	
EQUATIONS			
W	Width of Mixing Zone Perpendicular to Ground Water Flow = (0.175)(L)+(Y)	97.67	ft
Am	Cross Sectional Area of Aquifer Mixing Zone = (D)(W)	439.52	ft2
As	Surface Area of Mixing Zone = (L)(W)	2930.10	ft2
Qg	Ground Water Flow Rate = (K)(I)(Am)	794.80	ft3/day
Qr	Recharge Flow Rate = (As)(P/12/365)(V)	1.87	ft3/day
Qe	Effluent Flow Rate = (#I)(QI)	26.70	ft3/day
SOLUTION			
Nt	**Nitrate (as Nitrogen) Concentration at End of Mixing Zone =((Ng)(Qg)+(Nr)(Qr)+(Ne)(Qe)) / ((Qg)+(Qr)+(Qe))**	**2.42**	**mg/L**

BY: Sheila Cather
DATE: March 14, 2017

REV. 03/2005

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Carla Hardy & Eugene Kirilovich
COUNTY: Missoula County
LOT #: Sol Acreage Tract 2nd Filing for Lot 3 Lifting
NOTES: NW1/4, SW1/4 S8T113NR20W: Primary

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	92.42	ft
L	Length of Primary Drainfield's Long Axis	73.0	ft
W	Width of Primary Drainfield's Short Axis	8.00	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	7.583	ft
D	Distance from Drainfield to Surface Water	240.0	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5	ft
Ne			
Sw	Soil Weight (usually constant)	100.0	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200.0	ppm
#l	Number of Single Family Homes on the Drainfield	1.0	
CONSTANTS			
Pl	Phosphorous Load per Single Family Home (constant)	6.44	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (Pl)(#l)	6.44	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	442864.7	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	1361040.0	lbs
P	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	360.8	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	**56.0**	**years**

BY: Sheila Cather
DATE: March 14, 2017

NOTES:

** Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.*
*** Material type is usually based on test pit. A soil that can be described as loam (e.g. gravelly loam, sandy loam, etc.) or finer according to the USDA soil texture classification system is considered a "fine" soil.*

REV. 12/2004

Lifting of Lot 3 Sol Acreage Tracts 2nd Filing

This page looks at 8 inches of loam under the sand from the sand mound

Input Parameters		units			converted	
K	hydraulic conductivity	ft/day	807.3			From Consultant
i	groundwater gradient	ft/ft	0.00224			from MBMG map
b	aquifer saturated thickness	ft	10			Average from wells in the area (see conductivity sheet)
d	depth to groundwater	feet	0.666666	cm	20.31998	8 in of loam
dw	distance to drinking water well	ft				Nothing until it hits the GW
Q	drinking water well pumping rate	gpd	1000	ft3/day	133.672	estimated demand- multi user w/irrigation - use 11,850 gpd, single home 400, w
p	annual precipitation	in/year	14	cm/year	35.56	local rainfall from NOAA (https://www.ncdc.noaa.gov/cdo-web/datatools/norm
e	effluent application rate	gpd/sf	0.5	cm/year	743.5	in situ
	soil type (use dropdown)		loam			in situ
n	effective soil porosity	%	0.434			
	volumetric soil moisture content	mL/cm3	0.232			
	virulo soil type		loam			
	soil depth	m	0.203199797			
	virulo virus		Hep A			ran all sand viruses, this was the worst
	number of runs		1000000			5 for this virus
	highest # of exceedances		6287			highest value (5 runs,6111, 6085, 6287, 6153 and 6096 exceedances)
	log equivalent		2.20155654			

Results w/o Virulo:		
Horizontal travel time	0	logs
Vertical travel time - Wyoming	0.088347	logs
Total	**0.088347**	**logs**

Results with Virulo:		
Horizontal travel time	0	logs
Vertical travel time - virulo	2.201557	
Total	**2.201557**	**logs**

Lifting of Lot 3 Sol Acreage Tracts 2nd Filing

This page looks at only 10 inches of loamy sand, there is at least 24 to 40 inches of loamy sand available, as per soil profile

Input Parameters		units		converted		
K	hydraulic conductivity	ft/day	807.3			From Consultant
i	groundwater gradient	ft/ft	0.00224			from MBMG map
b	aquifer saturated thickness	ft	10			Average from wells in the area (see conductivity sheet)
d	depth to groundwater	feet	0.83333	cm	25.3999	10 inches of loamy sand
dw	distance to drinking water well	ft	30			Nothing until it hits the GW
Q	drinking water well pumping rate	gpd	1000	ft3/day	133.672	estimated demand- multi user w/irrigation - use 11,850 gpd, single home 400, w
p	annual precipitation	in/year	14	cm/year	35.56	local rainfall from NOAA (https://www.ncdc.noaa.gov/cdo-web/datatools/norm
e	effluent application rate	gpd/sf	0.8	cm/year	1189.6	application rate based on test pits
	soil type (use dropdown)		loamy sand			from test pits
n	effective soil porosity	%	0.41			
	volumetric soil moisture content	mL/cm3	0.0552			
	virulo soil type		loamy sand			from test pits
	soil depth	m	0.253998984			
	virulo virus		Hep A			ran all sand viruses, this was the worst
	number of runs		1000000			5 for this virus
	highest # of exceedances		20619			highest value (5 runs,20441, 20211, 20316, 20210 and 20619 exceedances)
	log equivalent		1.685732401			

Results w/o Virulo:		
Horizontal travel time	0.118553	logs
Vertical travel time - Wyoming	0.088347	logs
Total	**0.295247**	**logs**

Results with Virulo:		
Horizontal travel time	0.118553	logs
Vertical travel time - virulo	1.685732	
Total	**1.804285**	**logs**

Total with sand and loam @ end of mixing zone	**4.005842**	**logs**

Time of Travel Calculation

User supplies K, b, I, Q, n, and X (distance estimate) to calculate travel time and other parameters.

Input Values		
K=	807.3	ft/day
b=	10	ft
I=	0.002	ft/ft
Q=	133.67	ft3/day
n=	0.41	%
X=	30.00	ft

TOT and Capture Zone Results		
Tx	5.93	Days
Tx (years)	0.02	Years
Null Point	-1.18	ft
Boundary	3.70	ft
Flow Velo	5.06	ft/day

logs of inactivation:
0.118553

from EPA Ground Water Rule Source Assessment Guidance Manual, viruses are typically 0.02 log10 removal/day

Distance Traveled			Time of Travel			
feet	miles		days	months	years	
100	**0.02**		**19.8**	**0.7**	**0.05**	**Control Zone**
200	0.04		39.5	1.3	0.11	
300	0.06		59.3	2.0	0.16	
400	0.08		79.0	2.6	0.22	
500	0.09		98.8	3.3	0.27	
1,000	**0.19**		**197.6**	**6.6**	**0.54**	**Confined Aquifer Inventory Region**
2,640	0.50		521.6	17.4	1.43	
5,280	**1**		**1043.3**	**34.8**	**2.86**	**General Inventory Region**
7,920	2		1564.9	52.2	4.29	
10,560	2		2086.5	69.6	5.72	
15,840	3		3129.8	104.3	8.57	
21,120	4		4173.1	139.1	11.43	
26,400	5		5216.3	173.9	14.29	
52,800	10		10432.7	347.8	28.58	

TABLE VIII
Maximum Hydraulic Loading Rate

Soil Type	Soil Textural Classification Description	Loading Rate for Residential Effluent Using Gravity or Pressure Distribution gal./sq. ft./day
1	Gravelly and very gravelly coarse sands, all extremely gravelly soils excluding soil types 5 & 6, all soil types with greater than or equal to 90% rock fragments.	1.0
2	Coarse sands.	1.0
3	Medium sands, loamy coarse sands, loamy medium sands.	0.8
4	Fine sands, loamy fine sands, sandy loams, loams.	0.6
5	Very fine sands, loamy very fine sands; or silt loams, sandy clay loams, clay loams and silty clay loams with a moderate structure or strong structure (excluding a platy structure).	0.4
6	Other silt loams, sandy clay loams, clay loams, silty clay loams.	0.2

Soil Type	Soil Textural Classification Description	Loading Rate for Residential Effluent Using Gravity or Pressure Distribution gal./sq. ft./day
7	Sandy clay, clay, silty clay and strongly cemented firm soils, soil with a moderate or strong platy structure, any soil with a massive structure, any soil with appreciable amounts of expanding clays.	Not suitable

TABLE VI

Treatment Component Performance Levels and Method of Distribution[1]

Vertical Separation in inches	Soil Type		
	1	2	3-6
12 < 18	A - pressure with timed dosing	B - pressure with timed dosing	B - pressure with timed dosing
≥18 < 24	B - pressure with timed dosing	B - pressure with timed dosing	B - pressure with timed dosing
≥24 < 36	B - pressure with timed dosing	C - pressure	E - pressure
≥36 < 60	B - pressure with timed dosing	E - pressure	E - gravity
≥60	C - pressure	E - gravity	E - gravity

Treatment System Performance Testing Levels

Level	Parameters				
	$CBOD_5$	TSS	O&G	FC	TN
A	10 mg/L	10 mg/L	——	200/100 ml	——
B	15 mg/L	15 mg/L	——	1,000/100 ml	——
C	25 mg/L	30 mg/L	——	50,000/100 ml	——
D	25 mg/L	30 mg/L	——	——	——
E	125 mg/L	80 mg/L	20 mg/L	——	——
N	——	——	——	——	20 mg/L

Values for Levels A - D are 30-day values (averages for $CBOD_5$, TSS, and geometric mean for FC.) All 30-day averages throughout the test period must meet these values in order to be registered at these levels.
Values for Levels E and N are derived from full test averages.

SOIL PROFILE

CLIENT: **Carla Hardy & Eugene Kirilovich**
PROJECT: Sol Acreage Tract 2nd Filing - Lifting
LOT : Lot 3
LOCATION: NW1/4, SW1/4 S8T113NR20W

RECORDED BY: Steve Welling DATE: March 2, 2016

SOIL PROFILE #: SP# 2

SLOPE: 3%

VEGETATION: Native & Pasture Grasses

DEPTH (IN.)	THICKNESS (IN.)	TEXTURE	MODIFERS	STRUCTURE	MOISTURE	COLOR	COMMENTS
0" - 13"	13"	Loam		Organics	15% - 20%	Brown	Topsoil and Roots
13" - 32"	19"	Loamy Sand	Very	Cobbly	15% - 20%	Dark Gray	Cobbly 2"-4" dia. Rock
32" - 72"	40"	Sand	Very	Med. Gravelly	15% - 20%	Light Gray	Cobbly 2"-4" dia. Rock
72" - 120"	48"	Loamy Sand	Extremely	Cobbly	15% - 20%	Dark Gray	Cobbly 2"-4" dia. Rock

NOTE: No evidence of groundwater to 10 feet, no other concerns. Installed 10' PVC pipe.

TESTING PERFORMED BY:

Steve Welling (Missoula City-County Health Department Certified Site Evaluator)

SOIL PROFILE

CLIENT: **Carla Hardy & Eugene Kirilovich**
PROJECT: Sol Acreage Tract 2nd Filing - Lifting
LOT : Lot 3
LOCATION: NW1/4, SW1/4 S8T113NR20W

RECORDED BY: Steve Welling DATE: March 2, 2016

SOIL PROFILE #: SP# 1

SLOPE: 3%

VEGETATION: Native & Pasture Grasses

DEPTH (IN.)	THICKNESS (IN.)	TEXTURE	MODIFERS	STRUCTURE	MOISTURE	COLOR	COMMENTS
0" - 8"	8"	Loam		Organics	15% - 20%	Brown	Topsoil and Roots
8" - 48"	40"	Sand	Very	Med. Gravelly	15% - 20%	Light Gray	Cobbly 2"-4" dia. Rock
48" - 120"	72"	Loamy Sand	Extremely	Cobbly	15% - 20%	Dark Gray	Cobbly 2"-4" dia. Rock

NOTE: No evidence of groundwater to 10 feet, no other concerns. Installed 10' PVC pipe.

TESTING PERFORMED BY:

Steve Welling (Missoula City-County Health Department Certified Site Evaluator)

Wit

MONTANA NORTHWEST COMPANY

From: Jeff Standaert <jeffmt@mtnwco.com>
Sent: Thursday, March 30, 2017 12:06 PM
To: Wittenberg, Joyce
Subject: EQ#17-1160, Lifting of Sanitary Restrictions for Block 1, Lot 3, of Sol Acreage Tracts 2nd Filing
Attachments: Submittal.pdf

Please find the request for a hearing for the above referenced project.

If you need anything else, or if you require hard copies let me know.

Jeffrey P. Standaert, PE
Civil Engineer

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